

CAZON

ZI

-22H101

#113 T

113

COPY FOR MR. J. ALLAN ROSS



HYDRO-ELECTRIC INQUIRY COMMISSION

ENGINEERING DATA

THE QUEENSTON-CHIPIAWA POWER DEVELOPMENT

CHAPTER "J"—QUANTITIES

SUMMARY

WALTER J. FRANCIS & COMPANY

CONSULTING ENGINEERS

3 1761 119698025











Chapter J.

QUANTITIES

(Summary)

Walter J. Francis



Digitized by the Internet Archive  
in 2023 with funding from  
University of Toronto

<https://archive.org/details/31761119698025>

WALTER J. FRANCIS & COMPANY.

COPY FOR ENCLOSURE TO Mr. J. Allan Ross.

(J-Index)

INDEX TO CHAPTER J.

Summary

Subject	Page
QUANTITIES ..... Chart of Depth Excavation in Canal and Forebay .....	J-173
SUMMARY ..... Distribution Chart of Rock Excavation in Canal and Forebay .....	J-173
General ..... .....	J-173
Explanatory Notes Regarding Quantities .....	J-175
Progress Chart for Earth Excavation in Intake, Canal, Forebay and Power House .....	J-161
Progress Chart for Rock Excavation in Intake, Forebay and Power House .....	J-162
Progress Chart for Concrete Work in Canal and Forebay .....	J-163

**C O P Y**

(9-17498)

## INDEX TO CHARTER 7

Summary

Date

9-17498

5-1745	CHARTER LINE
5-1746	SUMMARY
5-1747	General
5-1748	Geographical Notes Regarding Organization

**COPY**

**WALTER J. FRANCIS & COMPANY.**

COPY FOR ENCLOSURE TO Mr. J. Allan Ross.

(J-Illus.)

**LIST OF ILLUSTRATIONS**

Summary

---

Subject	Page
Distribution Chart of Earth Excavation in Canal and Forebay .....	J-178
Distribution Chart of Rock Excavation in Canal and Forebay .....	J-179
Distribution Chart of Concrete Work in Canal and Forebay .....	J-180
Progress Chart for Earth Excavation in Intake, Canal, Forebay and Power House .....	J-181
Progress Chart for Rock Excavation in Canal, Forebay and Power House .....	J-182
Progress Chart for Concrete Work in Canal and Forebay .....	J-183

---

**COPY**

226. 23. 2. 1. 073 1. 06 1. 03

671-6 ~~.....~~ selected line items of net revenue due to trust administration  
will be used to calculate the amount of the annual audit fee.

Y900

WALTER J. FRANCIS & COMPANY.

COPY FOR ENCLOSURE TO MR. J. Allan Ross..

(J-173)

Chapter J.

QUANTITIES

Walter J. Francis

The first part of Chapter J, being pages J-1 to J-45 inclusive, refers to quantities in the right-of-way. The second part, being pages J-46 to J-99 inclusive, refers to temporary buildings and commissariat for construction. The third part, being pages J-100 to J-172 inclusive, deals with bridges and crossings. The present portion is devoted to a summary of the quantities of the principal elements and classifications completed at March 31st, 1922.

**COPY**

SUMMARY

General.

In the following tabulation are shown the totals of the quantities as at March 31st, 1922, classified under the various subdivisions of the work, while on pages J-175, J-176 and J-177 may be found explanatory notes indicated by reference numbers corresponding to those in the first column of the tabulation.

卷之三

চীন ও জাপান

**CONFIDENTIAL**

40-60 million odd to clear up now; and probably another 14 million (the latter assumption excludes the value of the 1981-1982 snow) which would bring the total to 100 million.

## WALTER J. FRANCIS &amp; COMPANY.

COPY FOR ENCLOSURE TO Mr. J. Allan Ross.

(J-174)

<u>Classification</u>	<u>Quantity</u>
-----------------------	-----------------

## Intake:

(1) Sheet piling .....	187,089 lin. ft.
(2) Earth in temporary dams .....	139,120 cu. yds.
(3) Earth excavation .....	537,067 cu. yds.

## Welland River:

(4) Earth excavation .....	1,194,637 cu. yds.
----------------------------	--------------------

## Canal:

## Earth excavation:

(5) Canal .....	9,651,557 cu. yds.
(6) Construction railways ....	<u>567,453</u> cu. yds.
Total earth excavation .....	10,219,010 cu. yds.

## Rock excavation:

(7) Canal .....	<u>5,412,87</u> cu. yds.
(8) Construction railways ....	<u>25,071</u> cu. yds.
Total rock excavation .....	3,866,318 cu. yds.

(9) Dredging .....	1,256,068 cu. yds.
(10) Concrete .....	304,299 cu. yds.
(11) Structural steel, control gate .....	Contract
(12) Rip-rap .....	986,028 cu. yds.

## Forebay:

(13) Earth excavation .....	49,082 cu. yds.
(14) Rock excavation .....	473,590 cu. yds.
(15) Concrete .....	6,440 cu. yds.

## Screen House:

(16) Earth excavation .....	1,526 cu. yds.
(17) Rock excavation .....	43,470 cu. yds.
(18) Reinforced concrete .....	29,522 cu. yds.
(19) Structural steel .....	Contract
(20) Steel for racks, gates and ice chute .....	1,449,826 pounds

## Penstocks:

(21) Rock excavation .....	17,836 cu. yds.
(22) Concrete .....	9,025 cu. yds.
(23) Steel work .....	1,833,350 pounds

1940-41

## DEFINITION

## CONTINUITY

• 1940-41: ~~1940-41~~  
 • 1940-41: ~~1940-41~~  
 • 1940-41: ~~1940-41~~

• 1940-41: ~~1940-41~~  
 • 1940-41: ~~1940-41~~  
 • 1940-41: ~~1940-41~~

## IDEAS

• 1940-41: ~~1940-41~~  
 • 1940-41: ~~1940-41~~

## VALUES

• 1940-41: ~~1940-41~~  
 • 1940-41: ~~1940-41~~  
 • 1940-41: ~~1940-41~~

**X900**

• 1940-41: ~~1940-41~~  
 • 1940-41: ~~1940-41~~  
 • 1940-41: ~~1940-41~~

• 1940-41: ~~1940-41~~  
 • 1940-41: ~~1940-41~~  
 • 1940-41: ~~1940-41~~

• 1940-41: ~~1940-41~~  
 • 1940-41: ~~1940-41~~  
 • 1940-41: ~~1940-41~~

## IDEAS

• 1940-41: ~~1940-41~~  
 • 1940-41: ~~1940-41~~  
 • 1940-41: ~~1940-41~~  
 • 1940-41: ~~1940-41~~

• 1940-41: ~~1940-41~~  
 • 1940-41: ~~1940-41~~  
 • 1940-41: ~~1940-41~~  
 • 1940-41: ~~1940-41~~

## IDEAS

• 1940-41: ~~1940-41~~  
 • 1940-41: ~~1940-41~~  
 • 1940-41: ~~1940-41~~

**WALTER J. FRANCIS & COMPANY.**

COPY FOR ENCLOSURE TO Mr. J. Allan Ross.

(J-175)

<u>Classification</u>	<u>Quantity</u>
<b>Power House and Tail-race:</b>	
(24) Earth excavation .....	22,790 cu. yds.
(25) Rock excavation .....	354,596 cu. yds.
(26) Concrete .....	38,584 cu. yds.
(27) Structural steel .....	Contract
<b>Hydraulic machinery:</b>	
Johnson valves .....	Contract
Turbines and auxiliary equipment .....	Contract
(28) Electrical generation and proportion of Superstructure .....	See Note
<b>Bridges:</b>	
Temporary structures, actual cost .....	\$485,486.03
Permanent structures .....	See Note
<b>Right-of-way .....</b>	<b>COPY.....</b> 3,540 acres

Explanatory Notes Regarding Quantities.

- (1) - The steel sheet piling, amounting to 187,089 lin. ft., was used in the two temporary dams at the intake. It was standard Lackawanna steel sheet piling.
- (2) - The earth in the temporary dams amounted to 189,120 cubic yards. It came from the general excavation and was deposited on either side of the steel sheet piling. The quantity includes 3,248 cu. yds. of rubble placed in temporary dam cribwork.
- (3) - The earth excavation, amounting to 537,067 cubic yards, was the general excavation on the site of the intake.
- (4) - The earth excavation in the Welland River amounted to 1,194,537 cubic yards. Of this quantity, 62 per cent. was excavated by the Lidgerwood cableway, 37 per cent. by the dredge "Boone" and 1 per cent. by the dredge "Cyclone", all performed in deepening and improving the natural channel of the river between the intake and the entrance to the canal proper.
- (5) - The earth excavation in the canal proper amounted to 9,651,557 cubic yards, apart from secondary excavation for the construction railways.

(371-6)

• 8 • 12 • 16 • 20 • 24 • 28 • 32 • 36 • 40 • 44 • 48 • 52 • 56 • 60 • 64 • 68 • 72 • 76 • 80 • 84 • 88 • 92 • 96 • 100

• 8 • This is a very interesting place.

and the results showed that the new method was more effective than the traditional methods.

19. *Journal of Clinical Endocrinology*, 1992, 130, 103-108.

卷之三

Y902

Y903

and 2000 m.s.w. and 3000 m.s.w. for sediment quality tests. Data sets = 121  
environmental variables. 2000 m.s.w. = 6000 sites. 3000 m.s.w. = 14000 sites. The following table lists  
-gathering species tests

CL - 10000, using 500-1000 M infusions until tolerance was reached and - 12000-15000 units were required to obtain a maximum response and were never less than 10000 units. Subsequent infusions were gradually reduced until tolerance was again reached and treatment was discontinued.

and for military advice. This task of guaranteeing performance often fell to the chief of staff or his chief of operations.

**WALTER J. FRANCIS & COMPANY.**

COPY FOR ENCLOSURE TO Mr. J. Allan Ross.

(J-176)

The earth excavation comprised the dry excavation in the earth portion and the overburden throughout the rest of the canal, but did not include the wet excavation taken out by the dredge "Cyclone" at the westerly limit of the mudbank

at 1,200 ft.

- (6) - The earth excavation for construction railways amounted to 567,453 cubic yards, and comprised such earth work as was done over the development for construction railways proper.
- (7) - The rock excavation in the canal amounted to 3,841,247 cubic yards, and consisted of the rock work in the prism of the canal - including over-break and scaling, in the foundations for the control gate and in wall foundations.
- (8) - The rock excavation for the construction railways amounted to 25,071 cubic yards, and comprised such rock work as was done over the development for construction railways proper.
- (9) - The dredging in the canal amounted to 1,256,068 cubic yards and comprised that portion of earth taken out under water, principally by the dredge "Cyclone", in the portion of the canal between the Welland River and the commencement of the rock section.  
**COPY**
- (10) - The concrete in the canal amounted to 304,299 cubic yards, and was placed on the floor, along the sides of the rock section, in the walls, and in the substructure of the control gate.
- (11) - The structural steel in the control gate was let in a single contract, as referred to in Chapter G.  
*(This metal which is the largest)*
- (12) - The total amount of rip-rap was 986,028 cubic yards, and comprised that portion of spoil from the rock excavation which was deposited along the sides of the canal to retain the unstable earth banks, and to form the fill at the crossing of Bowman's Gully and the base for the concrete lining on its slopes.
- (13) - The earth excavation in the forebay amounted to 49,082 cubic yards, and consisted of the overburden of earth in the forebay area.
- (14) - The rock excavation in the forebay amounted to 473,590 cubic yards, and comprised the whole of the rock in the forebay proper.
- (15) - The concrete in the forebay amounted to 6,440 cubic yards, and consisted of the concrete in the diffuser and the gunite where used on the exposed rock surfaces.  
*(This structural steel in the*
- (16) - The earth excavation in the screen house amounted to 1,526 cubic yards, being the overburden on the rock at the screen house.

and the rest of the universe will eat heretics no longer existent in the world.  
And so they will have their inheritance over the whole earth  
and all the other creatures. The last general judgment  
will be at the end of the world.

— 10. *Artemesia capitata* multicaulis subsp. *multicaulis* (L.) Wiegert — (1) —  
11. *A. capillaris* L. — (2) —*A. capillaris* L. — (3) —  
12. *A. capillaris* L. — (4) —*A. capillaris* L. — (5)

- Legdo out to mining - do at Snow Rock and at Johnson Ave  
out not much. Also out at village one hundred and fifteen  
list at one even thousand

6.1. *Indirect Optimization* involves solving one or more problems with  $\pi^*$  fixed until they no longer change, then  $\pi^*$  is set as the starting point. This will be discussed in the next section.

the above, which has been made by the author, will be published in the  
"Globe," "Advertiser," and other leading papers, and will be sent to  
any newspaper office in the country.

the new library will be built on the grounds where the old one stood - 1941  
will be celebrated July 2nd. The article was signed "John C. H. Smith"  
and the author was the president of the New Haven Library.

• Hoping which will be the case, I hope you will have a good time.

Indonesia has joined about 600,000 poor families in remote areas with - PAM (Pembangunan dan Perlindungan Anak) units which have been built by various local governments and districts at local costs with some grants and loans from the World Bank. The World Bank has also provided grants to the government of

Writing abilities should not be assessed solely with an achievement items such as - (ECD) short stories and diaries. To understand your child's learning progress

the following year, 1948, ECO-101, followed by ECO-102 in 1949, with 14 countries being added to the 14 original members and all seven new ECSC states being included.

— cu un alt, și încearcă să își aducă în primul rând să se întâlnească cu el — și să-l cunoască și să-l înțeleagă.

WALTER J FRANCIS & COMPANY

COPY FOR ENCLOSURE TO Mr. J. Allan Ross.

(J-177)

INQUIRY COMMITTEE  
Chairman

POWER DEVELOPMENT

FOR CONCRETE

IN FOREBAY

Made by W.J. Francis & Company

ENGINEERS

- (17) - The rock excavation in the screen house amounted to 43,470 cubic yards and comprised the rock excavation for the substructure. The line of demarkation between the screen house and the penstocks is taken as the easterly limit of the substructure of the screen house.
- (18) - The reinforced concrete in the screen house amounted to 29,522 cubic yards, and consisted of the complete substructure. As reinforcing had been used fairly generally, no attempt has been made to differentiate between mass and reinforced concrete.
- (19) - The structural steel in the screen house was let by contract, being manufactured and delivered for a lump sum. The erection was subsequently performed by day work.
- (20) - The steel used for racks, gates and ice chute amounted to 1,449,826 pounds, and consisted of the guides and heavy imbedded steel work, as well as movable parts.
- (21) - The rock excavation for the penstocks amounted to 17,836 cubic yards and comprised all the rock excavation therefor, from the easterly limit of the substructure of the screen house to the face of the escarpment. **COPY**
- (22) - The concrete in the penstocks amounted to 9,025 cubic yards, being all the concrete used in connection with the penstocks from the easterly limit of the substructure of the screen house to the end of the penstocks at the junction with the Johnson valves.
- (23) - The steel work in the penstocks amounted to 1,833,350 pounds and comprised all the riveted plate work in the penstocks erected up to March 31st, 1922.
- (24) - The earth excavation in the power house and tail-race amounted to 22,790 cubic yards, and consisted principally of loose overburden on the site of the power house.
- (25) - The rock excavation in the power house and tail-race amounted to 334,596 cubic yards and comprised all the rock excavation at the power house.
- (26) - The concrete in the power house amounted to 38,584 cubic yards and comprised all the concrete in the substructure up to the operating floor of the generator room.
- (27) - The structural steel in the power house was manufactured and delivered under contract, and subsequently erected by day work.  
See Chapter G.

100 99 98 97 96 95 94 93 92 91

0 1 2 3 4 5 6 7 8 9 N - E

WILMINGTON

INDIANAPOLIS

DALLAS

and 100% STP-1A at 1000 rpm which removed 90% of methionine from milk (~ 100% renaturation) and 100% of lactose and 90% lactose and 90% lactose and 90% lactose. The latter STP-1A treated conditions do not affect yields of 100% renaturation and 100% lactose and 90% lactose.

... which we believe must consist of extensive formations with - 161  
- 162 - probably the same age as the dolomites, the others like  
these being very similar in thickness which have been derived  
- 163 - from the dolomites, and which therefore have apparently  
- 164 - been deposited upon them.

nailed, surrounded by soft grey gravel stones and a sparse low-lying scrub - (at)  
- due any noticeable shift - and could it not be possible that the Miocene  
scrub had not been there? -

old, old, old of beavers and the activity passes with them down and - (int)  
they last half hour and the end of the afternoon they return  
after dinner as late as

Быть в сети YAHOO - это значит быть в сети жизни.

...and, as far as I can see, it is the best way to do it.

De personen over-lijdend hadden niet en voldoende levensverzekeringen om de kosten van de begrafenis te kunnen dekken.

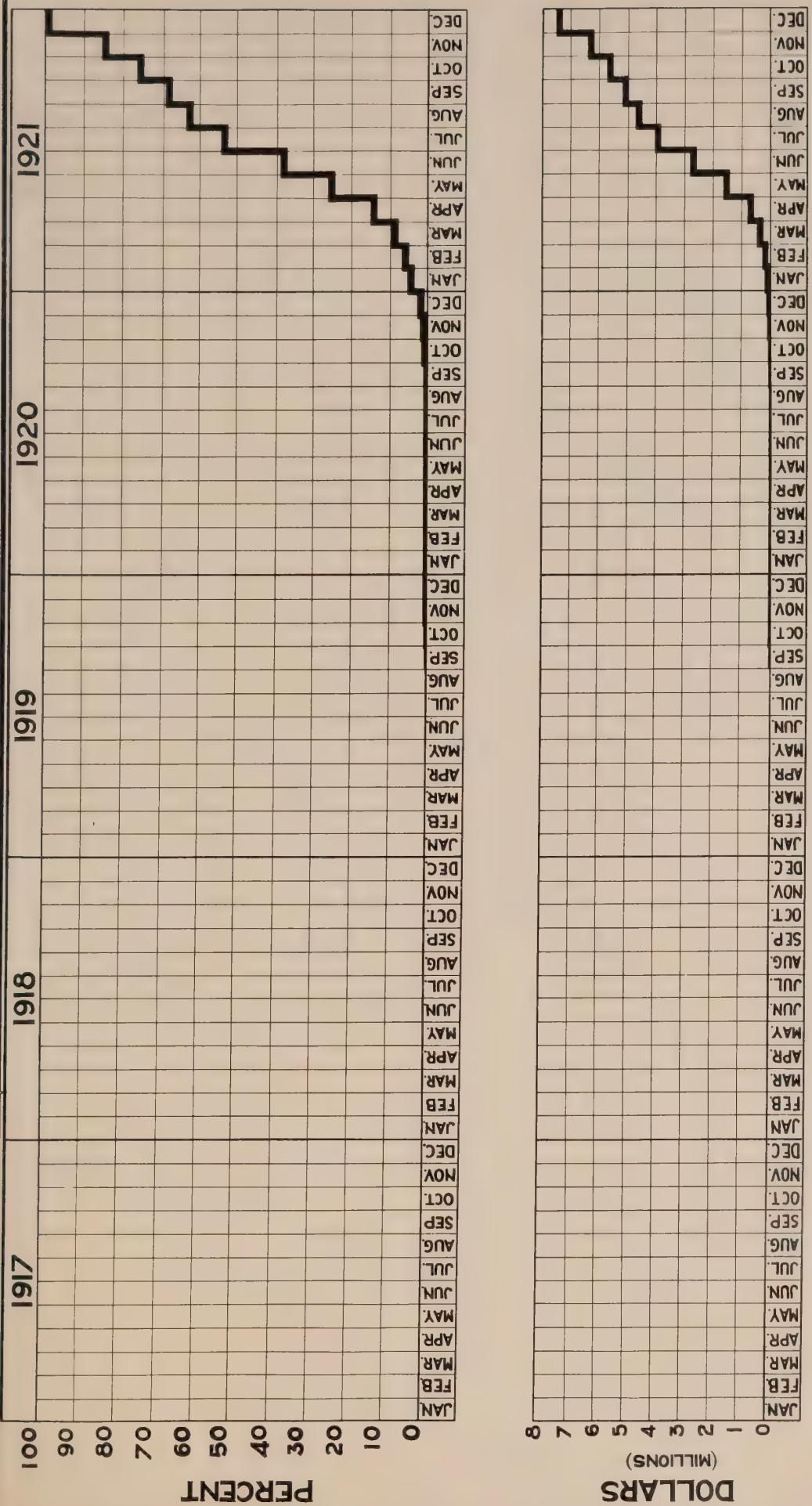
1960-61, if defining merit money as the amount left after all expenses had been paid, and if merit money was to be distributed only to the best students.

Die Auswirkungen von sozialer Trennung auf die Soziale Sicherheit und -versorgung der älteren Bevölkerung des Landkreises Berlin-Lichtenberg

**PROGRESS CHART FOR CONCRETE WORK  
IN CANAL AND FOREBAY**

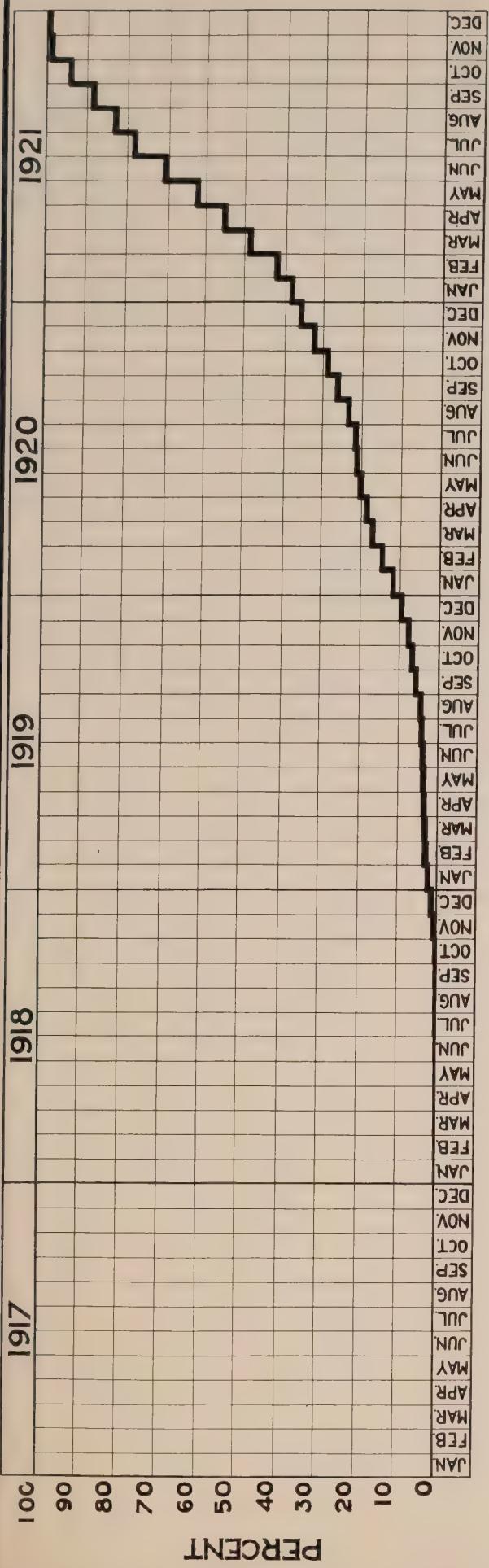
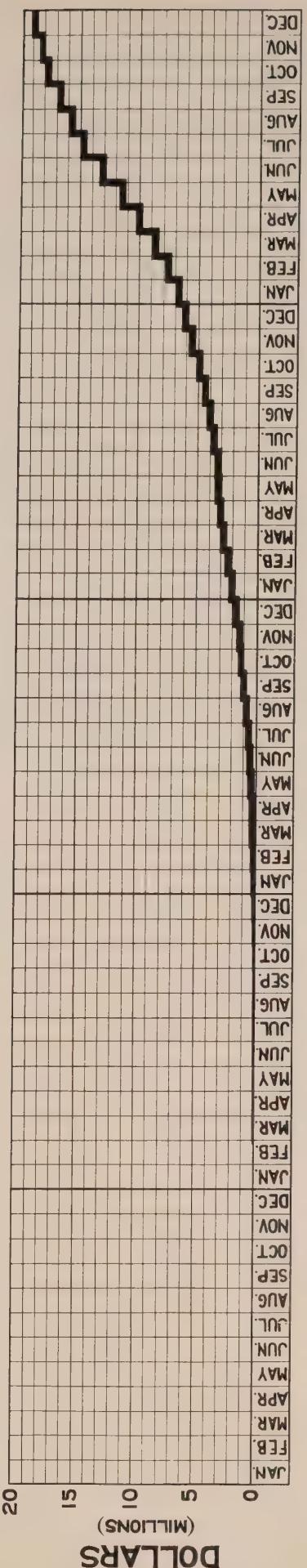
Hydro-Electric Inquiry Commission  
W.D. Gregory, Chairman  
Queenston-Chippawa Power Development

Toronto, May 3rd, 1923. Made by *H.D.* Checked by *W.J.F.*  
**WALTER J. FRANCIS & COMPANY**  
CONSULTING ENGINEERS





Hydro-Electric Inquiry Commission  
W.D.GREGORY, CHAIRMAN  
QUEENSTON-CHIPPWA POWER DEVELOPMENT  
Toronto, May 3rd 1923. Made by ~~W.D.~~ Checked by ~~W.D.~~  
WALTER J. FRANCIS & COMPANY  
CONSULTING ENGINEERS





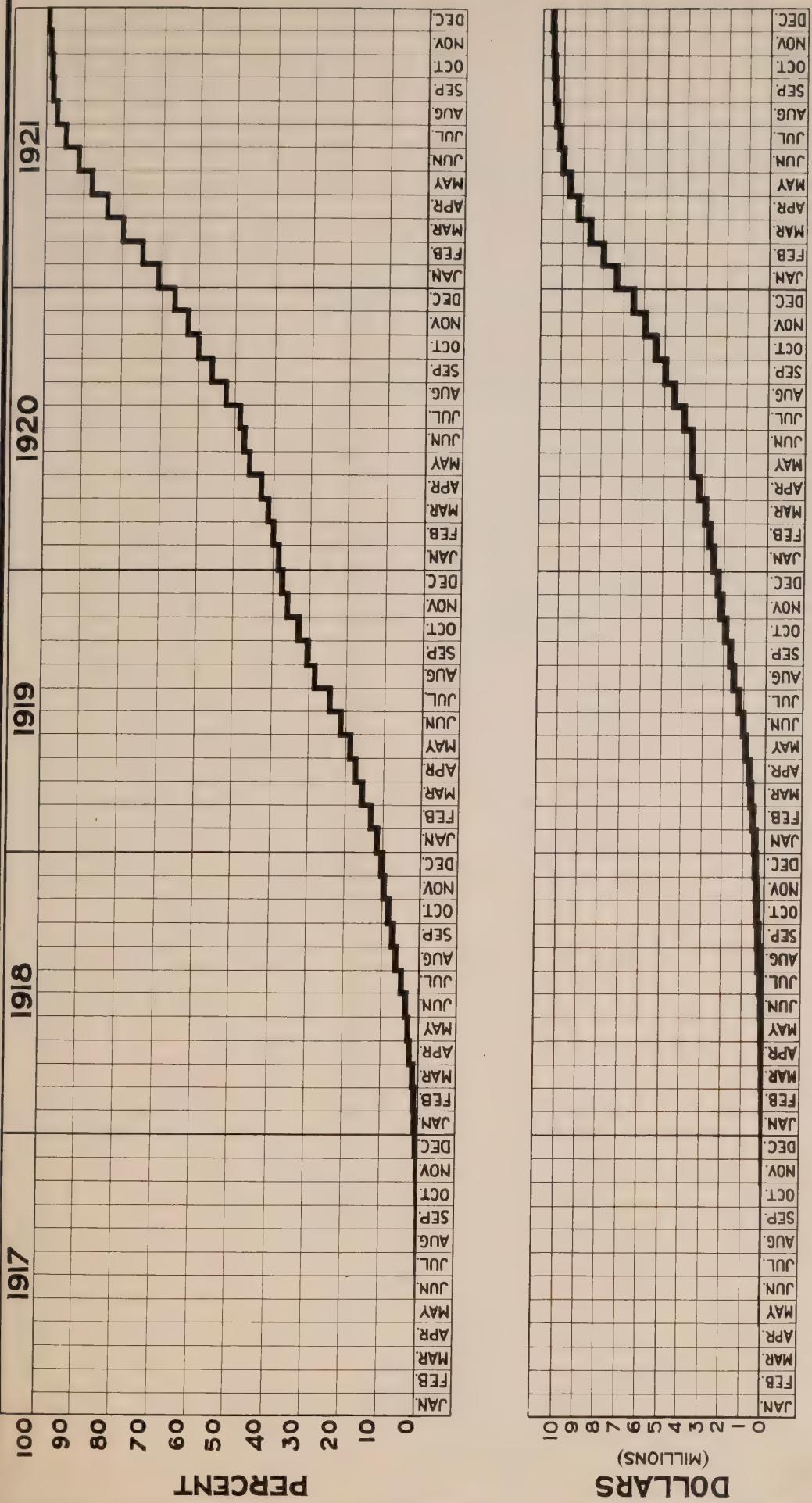
HYDRO-ELECTRIC INQUIRY COMMISSION

W.D.GREGORY, CHAIRMAN

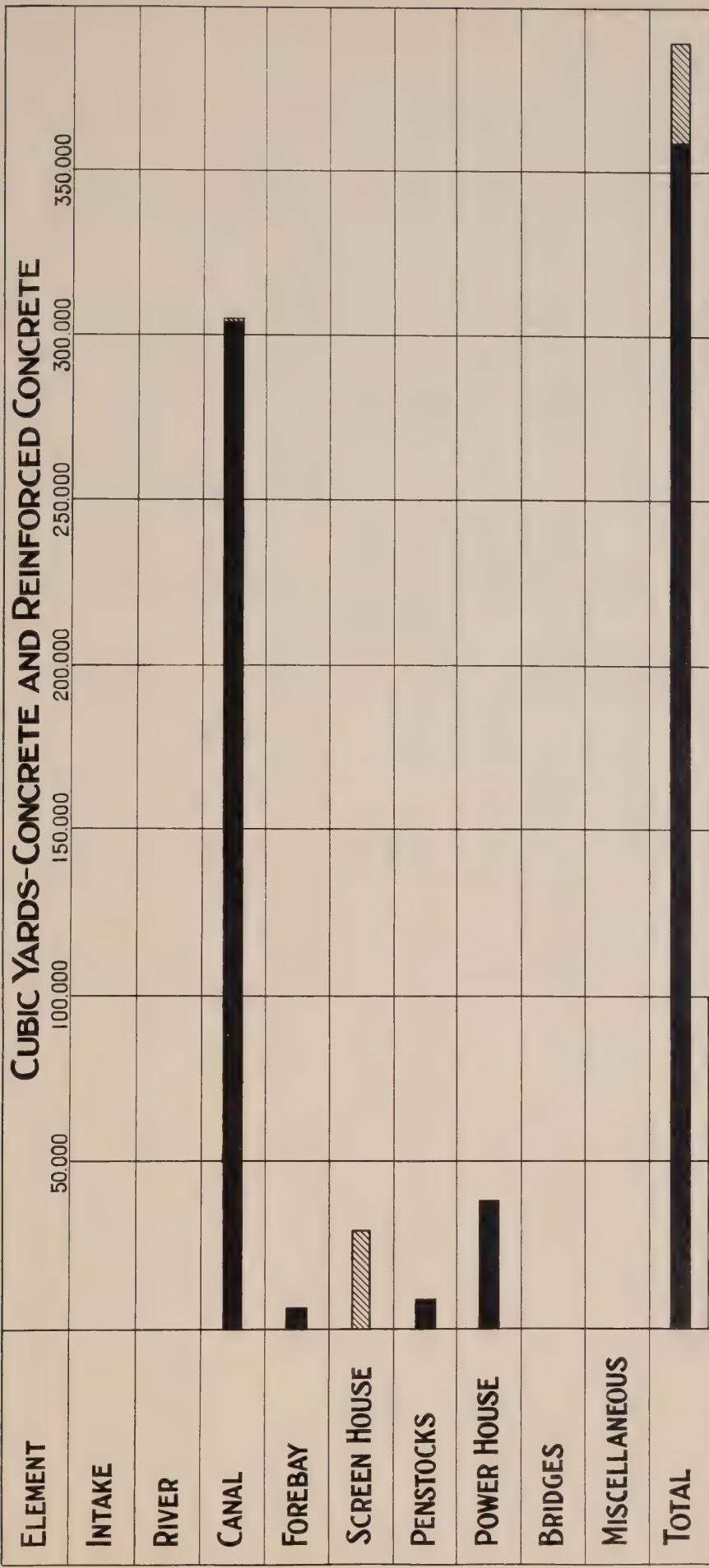
## PROGRESS CHART FOR EARTH EXCAVATION

**IN INTAKE, CANAL, FOREBAY AND POWER HOUSE**  
Made by *T. D.*, Checked by *H. D.*  
Toronto, May 3rd, 1923.

**WALTER J. FRANCIS & COMPANY**  
CONSULTING ENGINEERS.





**Hydro-Electric Inquiry Commission**

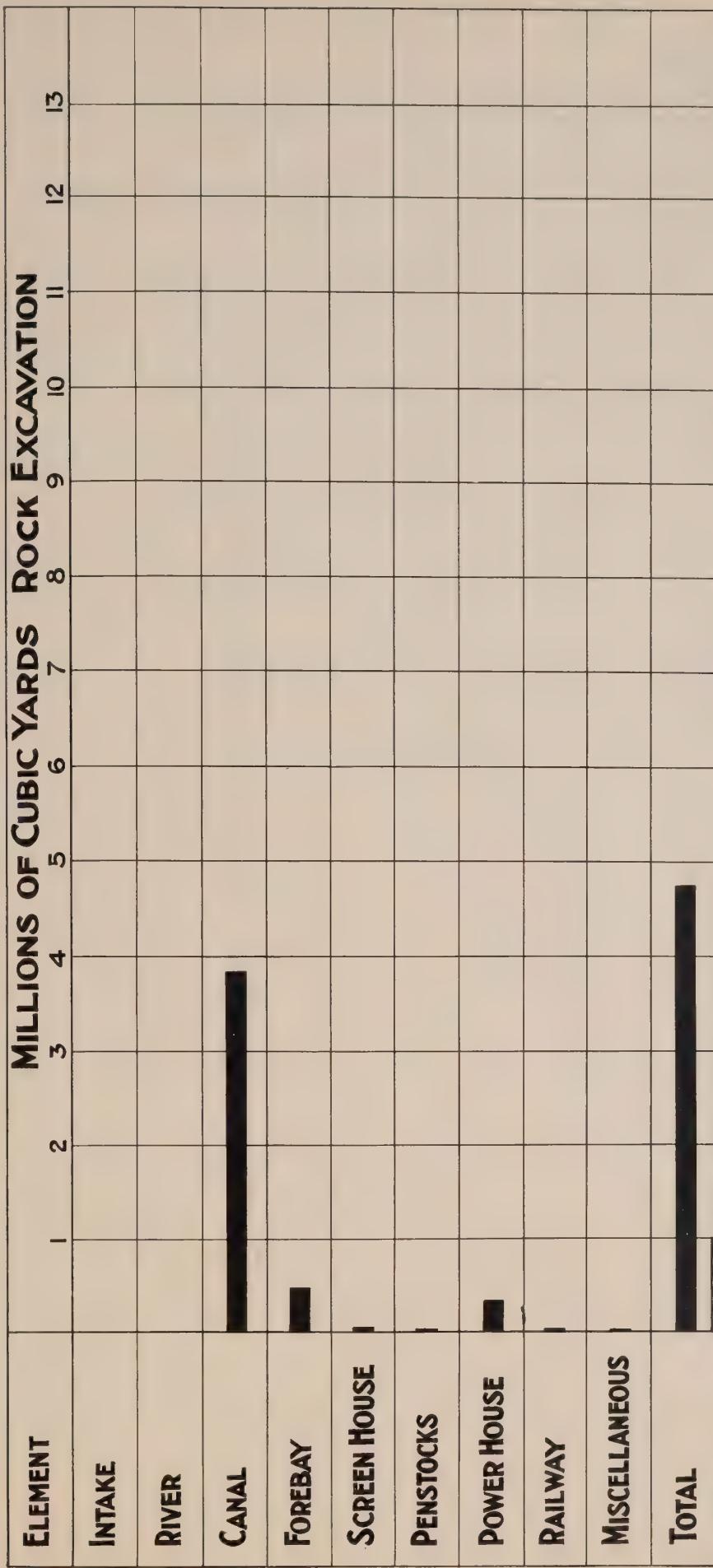
W.D.GREGORY, CHAIRMAN

**QUEENSTON-CHIPPWA POWER DEVELOPMENT  
DISTRIBUTION CHART  
OF CONCRETE WORK  
IN CANAL AND FOREBAY**

May 3rd, 1923. Made by ~~B.C.~~ Checked by ~~L.L.~~  
WALTER J. FRANCIS & COMPANY  
CONSULTING ENGINEERS

CONCRETE  
REINFORCED CONCRETE





HYDRO-ELECTRIC INQUIRY COMMISSION

W. D. GREGORY, CHAIRMAN

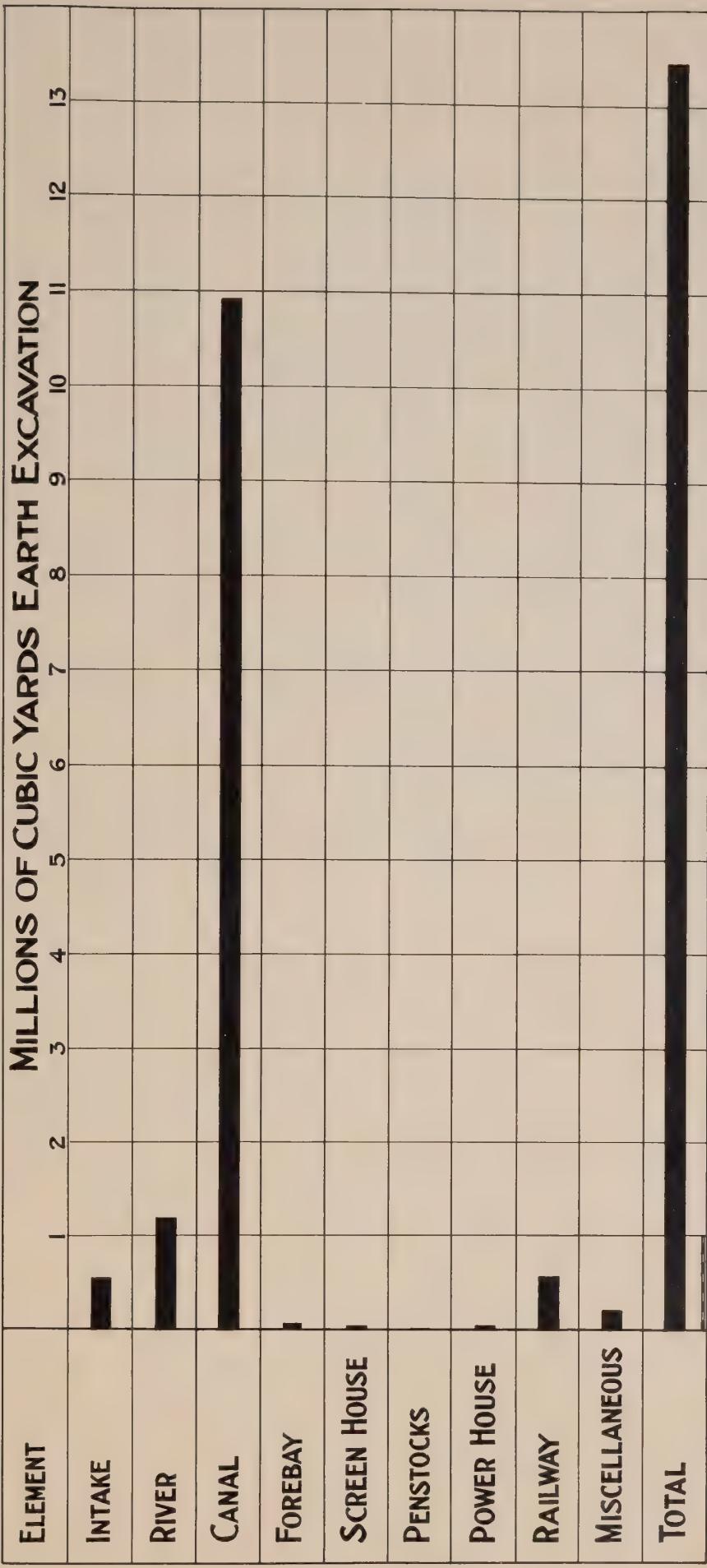
QUEENSTON-CHIPPWA POWER DEVELOPMENT

**DISTRIBUTION CHART  
OF ROCK EXCAVATION  
IN CANAL AND FOREBAY**

Toronto, May 3rd, 1923. Made by J. Francis & Company

WALTER J. FRANCIS & COMPANY  
CONSULTING ENGINEERS





Hydro-Electric Inquiry Commission  
W.D.GREGORY, CHAIRMAN  
Queenston-Chippawa Power Development  
**DISTRIBUTION CHART  
OF EARTH EXCAVATION  
IN CANAL AND FOREBAY**  
May 3rd, 1923. Made by G&G. Checked by *[initials]*.  
WALTER J. FRANCIS & COMPANY  
CONSULTING ENGINEERS



WALTER J. FRANCIS & COMPANY.

COPY FOR ENCLOSURE TO Mr. J. Allan Ross.

(J-184)

(28) - Under the title "Electrical Generation and Proportion of Superstructure" is included all the electrical generating apparatus up to and including the 12,000-volt bus bars, together with all the concrete in the walls and roof of the generator room, fifty per cent. of the walls and roof of the control room, and fifty per cent. of the switching room. The remainder of the superstructure is charged against the capital cost of the Niagara System of which it is considered an integral part being a transformer station, and not against the Queenston-Chippawa Power Development. The total of item 28 is \$3,214,413.15.

Three diagrams are included herewith as pages J-178, J-179 and J-180, to show the distribution of the earth work, the rock work and the concrete work according to the elements of the development. As supplementary information three other diagrams are included to show the progress of the work, J-181 being the Progress Chart for Earth Excavation in Intake, Canal, Forebay and Power House, J-182 being the Progress Chart for Rock Excavation in Canal, Forebay and Power House, and J-183 being the Progress Chart for Concrete work in Canal and Forebay.

*Walter J. Francis*

Consulting Engineer.

Toronto, May 3rd, 1923.

118648

should be sufficient and sufficient protection exists and exists - (1)

the language guaranteeing guarantees are the function of regulations

and the Act itself and the Constitution and guarantees are not

anywhere else contained in the Act and sufficient protection

exists and the Act itself and the Constitution and the

guarantees are not violated and there is no violation and the

Act itself is sufficient and sufficient protection exists and exists

and sufficient protection exists and sufficient protection exists

Y P O C

GOVERNMENT OF CANADA

1968-02-11







